



**Rocky Mountain
Remediation Services, L.L.C.**
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RF/RMRS-97-034

Close-Out Radiological Survey Plan (CRSP)

For The 690 Trailer Cluster

Revision 0

Rocky Mountain Remediation Services, L. L. C.

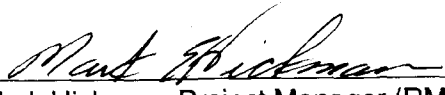
July 1997

**CLOSE-OUT RADIOLOGICAL SURVEY PLAN
FOR THE 690 TRAILER CLUSTER**

REVISION 0

JULY 1997

This Close-Out Radiological Survey Plan has been reviewed and approved by:



Mark Hickman, Project Manager (RMRS)

7-2-97


Date



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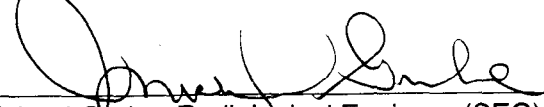


For Jeff Barroso
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7-3-97

Date

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7/2/97

Date

CLOSE-OUT RADIOLOGICAL SURVEY PLAN

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CLOSE-OUT RADIOLOGICAL SURVEY PLAN (CRSP) FOR THE 690 TRAILER CLUSTER

1.0 PURPOSE

The purpose of the Close-Out Radiological Survey Plan (CRSP) is to define the methods for collecting, analyzing, and documenting data to demonstrate that any radiological contaminants existing in the 690 Trailer Cluster are below levels that comply with established Rocky Flats Environmental Technology Site (RFETS) release criteria identified in Attachment 1, "Summary of Contamination Values for Unrestricted Release." The survey will include the floors and walls and fixed equipment, prior to release off-site. Because there is no reasonable potential for residual contamination, the ceilings and exterior surfaces of the 690 Trailer Cluster will not require surveys.

2.0 PROJECT DESCRIPTION

2.1 DECOMMISSIONING PROJECT SCOPE

The scope of the 690 Trailer Cluster Decommissioning Project consists of the evaluation or survey of each of the trailers to the criteria established in the RFETS 4-Q97-REP-1003, "Radiological Evaluation For Unrestricted Release of Property/Waste."

2.2 690 TRAILER CLUSTER DECOMMISSIONING HISTORY

A Statement of Work (SOW) has been prepared for the removal and disposal of the 690 Trailer Cluster. The removal is necessary due to the change in mission of the RFETS from the production of nuclear components to environmental cleanup and shutdown, in which the 690 Trailer Cluster has no identified function after Fiscal Year 1997.

2.3 FACILITY HISTORY

The 690 Trailer Cluster is comprised of 35 single-wide, prefabricated trailers (A-H and K-M) located in the south central portion of RFETS, T444A, previously used as a shower facility, and T371G a double-wide office trailer. Installation of the trailers commenced in 1963 and continued through 1986. The trailers were installed as single units with the exception of A (16 units), B (five units), E (two units), M (two units), and 371G (two units). Currently, all trailers are used as office trailers; Trailers K and L also serve as laboratory facilities.

3.0 SCOPE OF SURVEY

The surveys for the trailers will include all interior floors, wall surfaces, and fixed equipment. In addition, the hood exhaust system for T690K will be surveyed.

In order to maintain isolation controls on surveyed trailers, all personnel should be relocated prior to the beginning of each trailer survey. For survey and isolation control purposes, grouped trailers such as T690A will be surveyed as one survey area and not 16 individual trailers.

The scope of the 690 Trailer Cluster Decommissioning Project Close-Out Radiological Survey as defined in this document is to:

- Provide a description of the graded approach used in determining the intensity of sampling and survey data gathering which must be obtained to make the determination that the 690 Trailer Cluster structure meets the release criteria of Attachment 1.
- State how the characterization data obtained during the project completion will be used to support the final decommissioning decision.
- Develop a survey and sampling approach which, when implemented, will obtain adequate information to demonstrate that the trailers identified have no contamination levels above the release levels stated in Attachment 1.
- State the release criteria which will be used to free release the identified trailers.
- Act as the complete documentation package of sampling and survey data which is used to demonstrate acceptable release criteria was met at project completion.

4.0 SURVEY OBJECTIVE

The survey is designed to demonstrate that radioactive contamination is not above the applicable release criteria in the identified project trailers. The survey objectives are:

- Assemble all characterization and close-out radiological survey data into one document.
- Provide the methods which will be used in implementing the graded approach to verify no decontamination efforts are required or that those that have been used are complete.
- Provide a reliable and systematic approach to evaluating survey data used to demonstrate specific release criteria is met.

5.0 CONTAMINATION IDENTIFICATION

Based on the review of the historical records and process knowledge of the identified project trailers and associated equipment/systems, no contamination has been identified or is anticipated to be found during this final release survey.

6.0 RADIOLOGICAL RELEASE CRITERIA

The surface contamination criteria presented in Attachment 1 will be used as the release criteria. The survey methods and release criteria of Attachment 1 are in conformance with the following RFETS procedures:

4-K62-ROI-03.01	Performance of Surface Contamination Surveys
4-S23-ROI-03.02	Radiological Requirements for Unrestricted Release
4-Q97-REP-1003	Radiological Evaluation for Unrestricted Release of Property/Waste
I-P73-HSP-18.10	Radioactive Material Transfer and Unrestricted Release of Property and Waste

7.0 CLASSIFICATION OF AREAS BY CONTAMINATION POTENTIAL

All areas of the trailer cluster do not have the same potential for residual contamination and, therefore, do not require the same level of survey coverage to achieve an appropriate level of

confidence that building surfaces satisfy established release criteria. The CRSP is designed such that areas with higher potential for contamination receive a higher degree of survey effort. This will ensure that the close-out radiological survey process is both effective and efficient.

The following classifications and survey frequencies are based on the guidance from the following draft documents:

- NUREG/CR5849 - Manual for Conducting Radiological Surveys in Support of License Termination
- MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual

Three classifications of areas were used to design the 690 Trailer Cluster CRSP. These classifications are defined as follows:

- Affected/Impacted Areas are areas that have potential contamination (based on building operating history) or known contamination (based on past or preliminary characterization survey data). This would normally include areas where radioactive materials were used and stored, and where records indicate spills or other unusual occurrences could have resulted in the spread of contamination.
- Unaffected Areas are all areas not classified as Affected/Impacted or Non-Impacted. These areas are not expected to contain residual contamination above the limits in Attachment 1, based on limited knowledge of building history and limited previous survey information. However, insufficient documentation is present to exclude the area from survey requirements.
- Non-Impacted Areas are all areas not classified as Affected/Impacted or Unaffected. These areas are areas where there is no reasonable potential for residual contamination, based on knowledge of building history and/or previous survey information. Sufficient information is present to be assured that no residual contamination above the limits in Attachment 1 is present.

Initial classification of the project's trailer survey areas is provided below. These classifications will be either verified or downgraded by Radiological Engineering from Affected/Impacted to Unaffected or Non-Impacted during the conduct of the close-out radiological survey. In the event contamination above the Attachment 1 limits is detected in an unaffected area, additional surveys will be required and the area may be re-classified to "Affected" by Radiological Engineering.

Table 7-1 Survey Classifications

Area Description	Classification
T690K Two office areas in T690B (Cubical 11 - NE corner and Cubical 22 Mid Trailer - South Side) Office in west end of T690C	Affected/Impacted
All Other 690 Trailers	Unaffected
Ceilings and exterior surfaces of all 690 Trailers	Non-Impacted

8.0 RESPONSIBILITIES

8.1 PROJECT MANAGER (RMRS)

The Project Manager is responsible for reviewing and approving the 690 Trailer Cluster Decommissioning Project CRSP and Report.

8.2 RADIOLOGICAL ENGINEER (RMRS)

The Decommissioning Radiological Engineer is responsible to:

- Evaluate the project structures and appropriately classify the areas for survey.
- Develop overall technical aspects, planning, and scheduling for implementation of the Close-Out Radiological Survey.
- Define the content and ensure preparation of the 690 Trailer Cluster Decommissioning Project Close-Out Radiological Survey Report (CRSR).
- Resolve issues regarding survey layout and gridding requirements.
- Review surveys and sample analysis results for completeness, accuracy, and legibility.

8.3 RADIOLOGICAL ENGINEER (SSOC)

The Radiological Engineer is responsible to:

- Review and approve the 690 Trailer Cluster Decommissioning Project CRSP and Report.
- Ensure that the Close-Out Radiological Survey is developed and consistent with RFETS requirements.
- Review survey data for completeness, accuracy, and legibility. Ensure discrepancies in survey data are identified and corrected.
- Assist with the preparation of the CRSR.
- Preparation and approval of the Property Release Evaluation (PRE).
- Ensuring that appropriate background levels are applied.

8.4 RADIOLOGICAL CONTROL TECHNICIANS

The Radiological Control Technicians are responsible to:

- Perform surveys in accordance with this plan, approved RFETS procedures, and direction provided by the Radiological Engineer.
- Provide complete, accurate, and legible documentation for all surveys performed.

9.0 SURVEY AND SAMPLING METHODS AND FREQUENCY

9.1 RADIOLOGICAL

The floors, walls, and specified equipment will be surveyed for total, and removable alpha and beta contamination as indicated in the example survey instructions provided in Attachment 2, "Radiological Survey Instructions" and as follows:

9.1.1 Affected/Impacted Areas

Affected/Impacted Areas area survey and sampling requirements (because of the previous classification of areas as Radiological Controlled Areas or Radioactive Material Management Areas this close-out survey classification will be initially used for designated areas).

Floors

- One alpha and beta total surface activity measurements for each one square meter (approximately).
- One alpha and beta removable activity removable activity measurement for each one square meter (approximately).
- A 100% beta and alpha scan will be performed on accessible floor surfaces. If elevated count rates are detected, a fixed point measurement will be performed and if the area of elevated activity is above the unrestricted release level, the point will be marked. In the event no elevated activity is detected above the unrestricted release level in Attachment 1, Radiological Engineering may re-classify the area to "Unaffected/Non-Impacted" for the wall survey.

Walls/Fixed Equipment

- One fixed alpha and beta total surface activity measurements for each one square meter (approximately).
- One alpha and beta removable activity removable activity measurement for each one square meter (approximately).
- A 100% beta and alpha scan will be performed on accessible surfaces. If elevated count rates are detected, a fixed point measurement will be performed and if the area of elevated activity is above the unrestricted release level, the point will be marked.

9.1.2 Unaffected Areas

Unaffected Areas area survey and sampling requirements.

Floors/Walls/Fixed Equipment

One fixed alpha and beta total surface activity measurements for each 50 square meters (approximately) or 30 measurements, whichever is greater.

One alpha and beta removable activity removable activity measurement for each 50 square meters (approximately) or 30 measurements, whichever is greater.

A 10% alpha and beta scan based on total survey surface area will be performed on selected biased locations. If elevated count rates are detected, a fixed point measurement will be performed and if the area of elevated activity is above the unrestricted release level, the point will be marked.

9.1.3 Non-Impacted Areas

Non-Impacted Areas will not require surveys, and will be released in accordance with I-P73-HSP-18.10 Radioactive Material Transfer and Unrestricted Release of Property and Waste.

10.0 DESIGNATION OF MEASUREMENT LOCATIONS

Measurement locations will be clearly identified to provide a method of referencing survey results to survey measurement locations. Gridding will be used for the floors and walls for areas with Affected/Impacted final classification only. Grids may be marked by paint, a chalk line, or labels at grid locations. In areas where gridding is not practical or cost effective, measurement locations will be marked with labels or similar method or delineated on a map as directed by Radiological Engineering.

11.0 INSTRUMENTATION

Radiation detection and measurement instrumentation has been selected to provide reliable operations and adequate sensitivity to demonstrate that the measurements taken are sufficient to conclusively demonstrate that release criteria has been met. Instruments used to conduct the surveys will be calibrated and maintained in accordance with RFETS procedures. Provided below is a list of instruments to be used for survey. Other instruments may be used and longer count times performed in order to achieve a lower Minimum Detection Amount (MDA) as approved by Radiological Engineering.

Table 11-1 Instrument List

Instrument	Count Type	Allowable Background Counts	Acceptable Application	MDA (dpm/100 cm ²)
Bicron w/ A100 Probe	60 sec. (alpha)	2	Direct Alpha Surveys (Total Alpha Activity)	55
Bicron w/ B50 Probe	60 sec. (beta)	250	Direct Beta Surveys (Total Beta Activity)	610
NE Electra w/ DP6 Probe	60 sec. (alpha) 60 sec. (beta)	2 700	Direct Alpha Surveys (Total Activity) Direct Beta Surveys (Total Activity)	60 455
SAC-4	60 sec. (alpha)	1	Removable Alpha Swipes	18
LB-5100W	60 sec.* (alpha) 60 sec. (beta)	0.5 4	Simultaneous Removable Alpha and Beta Swipes	20* (alpha) 35 (beta)
BC-4	60 sec. (beta)	200	Removable Beta Swipes	205

* A two minute count may be performed to achieve an MDA that is a fraction of the removable limit for alpha

12.0 QUALITY ASSURANCE (QA)

12.1 SURVEY DOCUMENTATION

Records of the survey will be maintained in a survey package. The survey package will be the primary method of controlling and tracking close-out radiological survey results. The records compiled in a survey package will include (if applicable):

- Completed Contamination Survey Results (Fixed and Removable)
- Completed PREs
- Survey Area Diagrams/Maps
- Printout Of Smear Survey Analysis
- Laboratory Analysis Results
- Data Analysis Summary
- Completed Chain Of Custody Forms

12.2 CHAIN OF CUSTODY (COC)

Samples will be managed to ensure that there is an accurate record of sample collection, transport, analysis, and disposal. This will insure that samples are neither lost nor tampered with and that the sample analyzed is traceable to a specific location in the field. COC documentation shall be completed for all samples submitted for laboratory analysis. The COC form will be included as part of the close-out radiological survey documentation.

12.3 ANALYTICAL LABORATORY QA/QUALITY CONTROL (QC)

All samples collected for special analysis will be analyzed by RFETS laboratories or an approved contracted laboratory. The analysis will be performed by trained individuals using appropriate equipment and procedures. The laboratory will have analytical capabilities for the radionuclides of interest (Plutonium, Americium, Uranium) and an established QA/QC program which assures the validity of the analytical results. The laboratory analytical methods will be capable of measuring levels below the established release criteria. All results will state the detection limit for the analysis.

13.0 DATA INTERPRETATION AND COMPARISON WITH RELEASE LIMITS

13.1 REPORTING UNITS

All measurements will be reported in units appropriate for comparison with Attachment 1 surface contamination limits. Total and removable surface activity measurements will be reported in units of dpm per 100 cm².

Measurements of removable surface activity will be converted from gross count rate to units of net dpm/100 cm² by subtracting the background count rate of the smear counting detector and correcting the net count rate for detector efficiency. Measurements of total surface activity will be converted from observed gross counts per minute to net dpm/100 cm² by subtracting the background count rate and correcting the net count rate for efficiency and detector surface area.

Individual measurements will be compared against the removable release criteria for smears and the average total release criteria for total activity measurements. Smear measurement results less than the removable release criteria will be deemed acceptable. Total activity measurements greater than the average total release criteria may indicate the need for remediation, and all work

will stop until a Radiological Engineering evaluation is performed. The criteria delineated in Attachment 1, will be used to demonstrate attainment of the release criteria.

14.0 REPORTING SURVEY FINDINGS

A CRSR will be prepared at the conclusion of the project. The report will be prepared by the Decommissioning Radiological Engineer and the cognizant Radiological Engineer. A summary of the measurement results and overall conclusions showing that the building surfaces meet the release criteria will be provided.

- Total Surface Beta-Gamma Activity
- Total Surface Alpha Activity
- Removable Surface Beta-Gamma
- Removable Surface Alpha Activity Concentration
- Results of any Special Sampling

The CRSR and copies of applicable PRE forms will be included in the project close-out records.

15.0 REFERENCES

NUREG/CR5849 - Manual For Conducting Radiological Surveys In Support Of License Termination (Draft)

MARSSIM - Multi-Agency Radiation Survey And Site Investigation Manual (Draft)

4-K62-ROI-03.01 - Performance Of Surface Contamination Surveys

4-S23-ROI-03.02 - Radiological Requirements For Unrestricted Release

4-Q97-REP-1003 - Radiological Evaluation For Unrestricted Release Of Property/Waste

I-P73-HSP-18.10 - Radioactive Material Transfer And Unrestricted Release Of Property And Waste

Draft Reconnaissance Level Characterization Report For The T690 Complex Office Trailer Removal

Draft Decommissioning Program Plan

Rocky Flats Cleanup Agreement

Attachment 1

**Summary Of Contamination Values
For Unrestricted Release**

Summary Of Contamination Values For Unrestricted Release

RADIONUCLIDE (1)	Average Total (Fixed + Removable) Contamination dpm/100cm² (2), (3), (4)	Maximum Total (Fixed + Removable) dpm/100cm² (2), (4), (5)	Removable dpm/100cm² (2), (4), (6)
Transuranics, Ra-226, Ra-228, Th-228, Pa-231, Ac-227, I-125, I-129	100	300	20
Th-Natural, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-131, I-133	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay products, alpha emitters	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above (7)	5,000	15,000	1,000

NOTES:

- (1) Where surface contamination by both alpha and beta-gamma emitting radionuclides exists, the limits established for alpha and beta-gamma emitting radionuclides should apply independently.
- (2) As used in this table, disintegrations per minute (dpm) is defined as the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
- (3) Measurements of average contamination should not be averaged over an area of more than 1 meter². For objects with a total surface area of less than 1 meter², the average should be derived for each object.
- (4) The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mRad/hour and 1.0 mRad/hour, respectively at 1 cm.
- (5) The maximum contamination level applies to an area of not more than 100 cm².
- (6) The amount of removable material per 100 cm² of surface area should be determined by wiping an area of that size with a dry filter of soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. Except for transuranics and Ra-228, Ac-227, Th-228, Th-230, Pa-231, and alpha emitters, it is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate the total residual surface contamination levels are within the limits for removable contamination.
- (7) This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.

Attachment 2

Radiological Survey Instructions

Attachment 2 (Example)

RADIOLOGICAL SURVEY INSTRUCTIONS

Item/Area Description ¹	Radiological Survey ²			Scan ³ Survey	Special Instructions
	# of Alpha/Beta Swipes	# of Direct Alpha/Beta Measurements			
T-690A	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690B	A minimum of 1 measurement for each 1 m ²	A minimum of 1 measurement for each 1 m ²		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690B (cube 11, NE corner & cube 22, mid trailer, south side)	A minimum of 1 measurement for each 1 m ² (Note 4)	A minimum of 1 measurement for each 1 m ² (Note 4)		100% (Note 4)	Obtain measurements on interior floor/wall surfaces of the cube(s).
T-690C east end	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690C office in west end	A minimum of 1 measurement for each 1 m ² (Note 4)	A minimum of 1 measurement for each 1 m ² (Note 4)		100% (Note 4)	Obtain measurements on interior floor/wall surfaces and fixed equipment of the trailer(s).
T-690D	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690E	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690F	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690G	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690H	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690K	A minimum of 1 measurement for each 1 m ² (Note 4)	A minimum of 1 measurement for each 1 m ² (Note 4)		100% (Note 4)	Obtain measurements on interior floor/wall surfaces and fixed equipment of the trailer(s). Obtain additional measurements on the inside surfaces of the exhaust systems.
T-690L	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-690M	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-371G	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).
T-444A	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater	A minimum of 1 measurement for each 50 m ² or 30 whichever is greater		10%	Obtain measurements on interior floor/walls surfaces and fixed equipment of the trailer(s).

Attachment 2 (Continued)

NOTES

¹ See attached map of building layout.

² Surveys to be performed in accordance with 4-K62-ROI-03.01, "Performance of Surface Contamination Surveys". Other radiological references are 1-P73-HSP-18.10, "Radioactive Material Transfer and Unrestricted Release of Property and Waste", 4-S23-ROI-03.02, "Radiological Requirements for Unrestricted Release", and 4-N83-REP-1108, "Radioactive Material Management Area (RMMA) Determination".

³ Perform an alpha/beta scan survey of the percentage of the accessible surfaces, including fixed equipment, as listed.

⁴ In the event no contamination is detected on the floor surfaces during characterization/final survey, radiological engineering may relax the sampling and scanning requirements to the less restrictive unaffected frequency of 1/50m² or 30, whichever is greater, for smears and fixed points and a 10% scan survey of the remaining surfaces.

REVIEW AND APPROVAL

Prepared By: _____

Date: _____

Reviewed By: _____

Date: _____